GandALF — Exercise Sheet 11

Exercise 1. Let $\mathcal{A}$ be a weighted automaton over the semiring S. Given an algorithm that takes $\mathcal{A}$ and w and computes the value of $\mathcal{A}$ on w.

Exercise 2. Let $N, k \in \mathbb{N}$. Consider the uniform distribution over words from $\{a, b\}^N$, i.e., each word has the equal probability $\frac{1}{2^N}$. Assuming that N is much bigger than k, estimate the probability of $X_1 = \{w \mid w \text{ has at most } k \text{ letters } a\}$.

Let $\mathcal{A}$ be a deterministic finite-state automaton. Estimate the probability of $X_q = \{w \mid \mathcal{A} \text{ on } w \text{ avoids the state } q\}$. $X_q^k = \{w \mid \mathcal{A} \text{ on } w \text{ visits } q \text{ at most } k \text{ times }\}$.

Exercise 3. Let $\mathcal{A}$ be a deterministic weighted automaton with the LimAvg-value function. Show that the set $Y_{x,y} = \{w \mid \mathcal{A} \text{ on } w \text{ returns the value from } [a, b]\}$ is Borel.